FACT SHEET
AND
PERMIT RATIONALE

D H E C
PROMOTE PROTECT PROSPER

NPDES General Permit for Discharges from Bulk Petroleum Storage Facilities
NPDES Permit No. SCG340000

Permitting Engineer: Melinda Vickers 4/16/2009

I. PERMIT LIMITATIONS AND MONITORING REQUIREMENTS

This permit covers discharges from Bulk Petroleum Storage Facilities. These discharges may consist of storm water from diked secondary containment areas, hydrostatic test water from testing of new and used petroleum tanks and pipelines, storm water and wash water from loading rack areas, and utility water.

This fact sheet has been developed for the reissuance of this general permit. The previous permit was effective from April 1, 2003 until March 31, 2008. Coverage for existing facilities was administratively extended since permit applications were submitted in a timely manner.

The following documents are included as Attachments to this fact sheet.
Attachment 1: DMR data for existing facilities
Attachment 2: Water Quality Spreadsheets
Attachment 3 Maps showing all existing discharge locations, endangered species, water quality monitoring stations and Source Water Protection Areas Relative to Existing Discharges
Attachment 4: Map of Intakes Associated with Existing Bulk Petroleum Storage Facilities
Attachment 5: Table of Water Intakes and High Flows at TOT10 locations
Attachment 6: Summary of Proposed and Previous Permit Limits for Existing Facilities
Attachment 7: Summary of Permitted Facilities Information

Receiving Waters
This general permit covers discharges to all waterbody classifications in SC, except Trout Waters (TN, TPT, and TPGT), Outstanding Resource Waters (ORW and ONRW) and Shellfish Harvesting Waters (SFH) (See Part II.B.2.h). The basis for these restrictions is as follows:

Trout Waters: These waters are sensitive to temperature and turbidity (see R.61-68.G.9). Due to the characteristics of bulk petroleum facility discharges, the potential for high turbidity exists due to the storm water and hydrostatic testing discharges. There are also some facilities which discharge utility water that could impact temperature. Therefore, discharges to these waters have not been authorized in the general permit.

Outstanding Resource Waters: R.61-68.G.5 and 6 do not allow discharges to ORW or ONRW waters.

Shellfish Harvesting Waters: There are several facilities currently discharging to salt waters that have been evaluated for protection of shellfish. These existing discharges flow into the Cooper River. In this area, shellfish harvesting is prohibited (as defined below).

> Prohibited – Areas that are administratively closed for the harvesting of shellfish for any purposes related to human consumption. These closures are established adjacent to permitted wastewater discharges, marina facilities, or areas containing multiple point sources of pollution. The Prohibited classification is not based upon violation of a bacteriological standard.

In order to protect shellfish in all the waters of the State potentially affected by future discharges, the permit contains a prohibition on discharges to waters classified as SFH (Shellfish harvesting) per R.61-69. These waters may be sensitive to industrial wastewaters that could affect the taste of shellfish (R.61-68.G.11).

The permit previously was written to protect discharges to freshwaters and saltwaters, but did not include protection for waters where all fresh and salt water classifications may require protection (i.e. brackish waters that may be freshwater, but a short way downstream are saltwater or waters that are tidally influenced near the end of the FW designation). To protect these waters, the more stringent of the criteria for fresh water or saltwater will be applied. A separate set of limits pages has been added for this scenario.

Impaired Waters (303(d) list)
Because all the waters are being evaluated with consideration of no dilution at the discharge point, there is no further restriction to be imposed if any waters are impaired. Therefore, no additional permit requirements have been added for protection of impaired waters. Each facility will be evaluated before permit coverage is determined appropriate for its impact on impaired waters depending on what is being discharged.

Endangered Species
Maps showing the location of endangered species are included in Attachment 3. Due to the distance between the current discharges and the areas with endangered species, no additional permit requirements have been determined to be necessary in this renewal. Future discharges will be evaluated for impact at the time permit coverage is determined. Coverage may be denied based on the potential for impact to endangered species. Part II.B.2.g limits permit coverage.

Wastewater Treatment and Operator Requirements
Some of the existing facilities have wastewater treatment. The treatment provided ranges from settling ponds to oil/water separators to carbon adsorption units. No treatment is required unless needed to meet permit limits, but where treatment is present, wastewater operator inspections are required. The previous permit allowed for exemptions to the required frequency with justification from the facility of their operations. That provision has made it difficult to keep track of which facilities have been granted less frequent inspections or other requirements. Since most of the facilities have similar treatment and operator requirements, the operator inspection frequency has been standardized for all facilities covered by the permit per the condition below as seen in Part II.E of the permit.

> Facilities with oil/water separators, pH adjustment systems, carbon absorption units, and/or settling (retention and detention) ponds shall provide for the performance of weekly treatment facility inspections by a certified Grade D-P/C operator. If the discharge is less frequent than weekly, the inspection of the wastewater treatment system may be performed based on the frequency of discharge, but in no case less than monthly. Records of discharge frequency and rainfall occurrence must be kept on-site with operator logs.

There will be no schedule of compliance allowed for this item. A facility must have the proper operator in place and meet the designated inspection frequency when the reissued permit becomes effective.

Storm Water Pollution Prevention
Language, which was included in the previous permit in Part VIII.F, requiring a Storm Water Pollution Prevention Plan (SWPPP) has been taken from the State's NPDES General Permit for Storm Water Discharges Associated with Industrial Activity, SCR000000. Updates to the language have been made to be consistent with the most recent storm water general permit.

Hydrostatic Testing
As routine container maintenance, bulk-storage facilities typically conduct hydrostatic tank testing every five to six years. Prior to testing, the permittee empties the tank of product, and properly disposes of tank-bottom wastes. Tanks are cleaned, coated, and welded (as necessary), then refilled with water for hydrostatic pressure testing. Some facilities use river water, while others use potable city water. Testing water is then drained from the tank. Because this test-water may contain petroleum products, the permittee shall sample and analyze this waste prior to discharge. Hydrostatic testing of new tanks may also occur.

Erosion Control Requirements
Requirements have been added to prevent erosion during discharge of hydrostatic test waters due to the significant volume

and flow that could be discharged during these events. The new condition was taken from the NPDES General Permit for Hydrostatic Test Water Discharges (SCG670000).

Other Information

Since the discharges consist of mostly storm water and the non-storm water discharges are intermittent discharges, only daily maximum limits will be applied. In some cases, the daily maximum limits are derived from monthly average limits. Also, the sample type has been designated as grab for all parameters.

All parameters monitored in the previous permit have been evaluated for reasonable potential in this renewal permit using the DMR data provided over the past several years from each facility. A summary of the DMR data is included in Attachment 1.

Parameter Information

Flow

1. Previous permit limits: FW & SW
   Daily Maximum: MR, MGD
   Sampling Frequency: 1/quarter
   Sample Type: Estimate
2. DMR Data: DMR data is summarized in the table in Attachment 1.
3. Conclusion: Flow will be monitored and reported as in the previous permit. For discharges to all waterbody types, the following applies:
   Daily Maximum: MR, MGD
   Sampling Frequency: 1/quarter
   Sample Type: Estimate

Dilution Calculations

Since this is a general permit, consideration has been given to multiple dilution scenarios to address existing as well as future discharges. The way various dilution factors are determined is explained later in this rationale. There are 4 different dilution factors to consider in development of permit limits. Among the dilution factors, two of them use the stream critical flow (typically 7Q10) and annual average flow at the point of discharge and other two use the stream critical flow (typically 7Q10) and annual average flow at the source water protection area boundary (TOT10).

Among the existing facilities, the stream critical flow or 7Q10 and annual average flow at the discharge point is zero for many, if not all, of them. These discharges flow to small creeks or tributaries. This being the case, the general permit has been written allowing for no dilution at the discharge point.

Later sections of this rationale explain how source water protection is implemented. The evaluation in the previous permit was based on consideration of existing discharges only. Also, an incorrect intake was mistakenly evaluated in the last permit. Attachment 4 includes a map showing the intakes and the current discharges in relation to them. Table 1 below shows the intakes affected by the current discharges and their associated flows. Using this existing facility data alone is not sufficient to protect all source waters and intakes in the State if future discharges were to be covered under the permit. This data along with all source water flows from around the State has been used to set up the permit to allow flexibility for different permitting situations that may impact source water, giving higher dilution credit to those discharges that have higher stream flows at the source water protection area boundary.

Table 1: Source Water Flows for Existing Discharges

INTAKE	7Q10 at highest TOT10	Ann Avg Flow at highest TOT10
S07101	3735.00	11770.77
S19101	3600.00	7515.00
S20103	872.17	4615.34
S24101	144.32	1089.60

The following dilution scenarios have been evaluated and permit limits developed accordingly for each dilution. Dilution calculations are shown in Section II.G.2 later in this rationale.

1. Lowest dilution: In this scenario, all 7Q10 (or critical flows) and annual average flows are considered to be zero at the discharge point and at the source water protection area boundary (TOT10) with the highest flow. The effluent flow is irrelevant since no stream flow is being allowed.

2. Highest dilution: In this scenario, the 7Q10 (or critical flow) and annual average flow are considered to be zero at the discharge point. The highest 7Q10 (or critical flow) and annual average flows from among all high flows at the source water protection area boundaries (TOT10s) in the State have been used. See Attachment 5 for the flows and intake information. The effluent flow for this scenario will use the DMR-reported long-term average flow. This combination of flows represents a high dilution scenario.

3. Middle dilution: In this scenario, the 7Q10 (or critical flows) and annual average flows are considered to be zero at the discharge point. A median 7Q10 (or critical flow) and annual average flow from among all high flows at the source water protection area boundaries (TOT10s) in the State have been used. See Attachment 5 for a list of all these flows and the median values. The effluent flow for this scenario will use the DMR-reported long-term average flow. This combination of flows represents a mid-range dilution scenario.

4. No Intake: In this scenario, the 7Q10 (or critical flows) and annual average flows are considered to be zero at the discharge point. This scenario considers that there is no intake downstream of the discharge, so no additional protection for source water is needed.

From the spreadsheets run for the various scenarios described above (see Attachment 2), there are only a few parameters that are affected by the change in source water protection dilution values (DF3 and DF4). The dilution values for the three scenarios come from the Metals sheet of each set of spreadsheets and are summarized in the table below. For permit limits, a range of dilutions has been established for each dilution scenario described above to determine limits for these parameters:

Table 2: Dilution Information

Scenario	**Dilution Value**		**Dilution Range Using DF3**	**Dilution Range Using DF4**
	DF3	**DF4**	**DF3 Range**	**DF4 Range**
Lowest dilution	1	1	1-1.5	1-10
Middle dilution	1.751	11.745	>1.5-100	>10-500
Highest dilution	166.046	714.036	>100	>500
No Intake	DF3 and DF4 not used in calculations; limits based on DF1 and DF2 only			

Consideration of dilution when hydrostatic test waters are discharged: Flow data from the existing facilities has been reviewed. There are many DMR-reported flows that are significantly higher than the "normal" flows expected due to storm events. This is particularly evident in comparing data for facilities near each other. One would expect storm events to generate similar flow data at nearby facilities. Due to the impact of a large discharge flow on dilution, particularly flow from hydrostatic testing events, a condition has been added to the permit that requires alternate, more stringent limits be applied when a discharge from a large hydrostatic testing event occurs.

In order to define a "large" hydrostatic testing event, consideration must be given to the combination of effluent flow and stream flow used to set the permit limit for a given parameter. Due to the complexity already involved in determining the permit limits from the various dilution scenarios described above, this decision will be simplified by use of the lowest dilution situation when any hydrostatic testing occurs from tanks or pipelines where the flow of the total discharge increases by more than 50% of its normal (non-hydrostatic testing event) flow.

Determination of parameters to monitor and/or limit

As in the previous permit rationale, the previously referenced document *General Guidance for Evaluating and Characterizing Petroleum Releases* (Michigan Department of Environmental Quality Storage Tank Division, Sep 1999) and several other documents have been used as guidance to place petroleum products into one of the following categories: Leaded Gasoline, Unleaded Gasoline, Petroleum Solvents, Light Distillate Oils, and Residual Fuel Oils. The format of the permit has been changed to remove the permitting in categories and instead have monitoring based on what is discharged from an outfall. A discussion of each pollutant is listed below.

Sampling frequency and sample type

Previously, all parameters have been sampled quarterly by grab sample. This particular sample frequency and type were used for all parameters due to the intermittent nature of the discharges from bulk terminals. Quarterly sampling by grab will continue for all parameters as in the previous permit. See Whole Effluent Toxicity for alternate testing requirements.

Water Quality Information

The water quality criterion and other data used to set permit limits is included in the spreadsheets shown in Attachment 2. Limits for freshwaters (FW), saltwaters (SW) and brackish waters (FW-SW) are included in each set of sheets. Where data is not included in the spreadsheets, it will be documented with each parameter below.

Total Suspended Solids (TSS)

Previous permit limits: Sampling is required for all discharges of storm water from secondary containment and/or hydrostatic testing of new tanks and pipelines.

FW Daily Maximum: MR mg/l
SW Daily Maximum: 110 mg/l

Other information: A long-term average TSS for all existing facilities' DMR data has been used in calculation of metals limits that involve metals partitioning.

Conclusion: A daily maximum TSS limit of 100 mg/L is recommended as a minimum storm water management practice for all discharges to all waterbody types. This value was taken from the benchmark in Sector P for Land Transportation and Warehousing in EPA's Multi-Sector Permit for Storm Water Discharges Associated with Industrial Activity. Also, based on the NPDES General Permit for Utility Water Discharges, SCG250000, TSS is monitored or limited for every category covered. Therefore, the same limit of 100 mg/l will be applied to utility water discharges. Sampling is required for all discharges from bulk terminals.

Compliance schedule: No schedule of compliance is needed to meet the limits based on DMR data.

FW Daily Maximum: 100 mg/l
SW Daily Maximum: 100 mg/l
FW-SW Daily Maximum: 100 mg/l

pH

Previous Permit Limits: Sampling is required for all discharges of storm water from secondary containment and/or hydrostatic testing of new tanks and pipelines.

FW: minimum: MR, standard units, maximum: 8.5, standard units
SW: minimum: MR, standard units, maximum: 8.5, standard units and pH shall not vary more than one-half pH unit above or below that of effluent-free waters in the same geological area having similar total salinity, alkalinity and temperature.

Water Quality Data: Effluent Limits for pH are established in Reg. 61-68.G. For Class FW (Freshwater), pH shall be between 6.0 and 8.5 standard units. For Classes SA and SB (Saltwater), the pH shall be between 6.5 and 8.5 and shall not vary more than one-half of a pH unit above or below that of effluent-free waters in the same geological area having similar total salinity, alkalinity and temperature.

Other information: None

Conclusion: Limits on pH will be included to meet the water quality standards. Instead of monitoring the lower pH limit, a limit has been added. To address compliance issues that may accompany this new limit, an alternate limit calculation is available based on the actual pH of the receiving stream. Sampling is required for all discharges from bulk terminals.

FW: 6.0 to 8.5 su
SW and FW-SW: 6.5 to 8.5 and shall not vary more than one-half of a pH unit above or below that of effluent-free waters in the same geological area having similar total salinity, alkalinity and temperature.

If the pH of the receiving stream is less than 6.0 su for freshwater or 6.5 su for saltwaters, the discharge pH may be less than 6.0 su or 6.5 su, respectively, only if the discharge pH is not less than the stream pH by a difference of more than 0.2 standard units. Example: If the stream pH is 5.5, the discharge pH must between 5.3 and 8.5. The difference between the stream pH (5.5) and the discharge pH (5.3) is 0.2. This alternate limit will be granted only if the stream pH is analyzed on the day of the discharge, the results satisfy the above conditions, and the results are submitted with the DMR forms. (This condition was taken from the NPDES General Permit for Hydrostatic Test Waters, SCG670000.)

Gasoline Range Organics (GRO) and Diesel Range Organics (DRO)

Previous Permit Limits: Sampling is required for GRO for all discharges from bulk terminals. Sampling for GRO is required only for discharges of petroleum solvents, light distillate oils and residual fuel oils.
FW & SW: Daily maximum: MR mg/l

Other information: The terms "Gasoline Range Organics" and "Diesel Range Organics" refer to a variety of screening methods for solvent-extractable organic compounds that generally represent the gasoline and diesel range of hydrocarbons, respectively. These parameters were included on the previous permit as monitor and report (MR) to collect data on these indicator parameters.

Conclusion: Previous monitoring requirements will continue in this permit with the addition of monitoring for FW-SW brackish waters. Elevated levels of these indicator parameters may indicate the presence of pollutants not limited. The monitoring requirement is for all waterbody types. Sampling is required for GRO for all discharges from bulk terminals. Sampling for GRO is required only for discharges of petroleum solvents, light distillate oils and residual oils.
FW Daily maximum: MR mg/l
SW Daily Maximum: MR mg/l
FW-SW Daily Maximum: MR mg/l

Copper

Previous Permit Limits:
FW Daily maximum: 0.013 mg/l
SW Daily Maximum: 0.006 mg/l

Other information: Copper may be present from a number of sources, including petroleum products, sediments disturbed during storm events and the water used for hydrostatic testing.

Conclusion: Permit limits for FW and SW will continue in this permit with the addition of limits for FW-SW brackish waters. The previous limits for FW have changed slightly due to the recalculation of the metals value using different TSS information. Sampling is required for all discharges from bulk terminals.

Compliance schedule: No schedule of compliance is needed to meet the limits based on DMR data.
FW Daily maximum: 0.011 mg/l
SW Daily Maximum: 0.006 mg/l
FW-SW Daily Maximum: 0.006 mg/l

Lead

Previous Permit Limits:
FW Daily maximum: 0.083 mg/l
SW Daily Maximum: 0.220 mg/l

Other information: Lead may be present from a number of sources, including petroleum products, sediments disturbed during storm events and the water used for hydrostatic testing.

Conclusion: Permit limits for FW and SW will continue in this permit with the addition of limits for FW-SW brackish waters. The previous limits for FW have changed slightly due to the recalculation of the metals value using different TSS information. Sampling is required for all discharges from bulk terminals.

Compliance schedule: No schedule of compliance is needed to meet the limits based on DMR data.

FW Daily maximum: 0.051 mg/l
SW Daily Maximum: 0.22 mg/l
FW-SW Daily Maximum: 0.051 mg/l

Zinc

Previous Permit Limits: Sampling required when hydrostatic test water is discharged from used tanks and pipes.
FW Daily maximum: MR mg/l
SW Daily Maximum: MR mg/l

Other information: Zinc may be present from a number of sources, including petroleum products, sediments disturbed during storm events and the water used for hydrostatic testing.

Conclusion: There is reasonable potential to cause a water quality violation at all dilutions and for all waterbody types. Limits for all waters will be added. Since zinc may be expected to be present in gasoline products, monitoring should not be limited to just hydrostatic testing discharges, but to any discharge with the potential for contact with gasoline. Therefore, sampling is required for all discharges from bulk terminals.

Compliance schedule: Since these are new limits and the DMR data indicates limits may not be consistently met, a schedule of compliance is needed for the FW and SW limits. Two years will be granted to meet these new limits. Since no existing facility is covered or needs to be covered by the FW-SW limits, the limits will be effective immediately upon coverage to a new facility or discharge.

Interim:
FW Daily maximum: MR mg/l
SW Daily Maximum: MR mg/l
FW-SW Daily Maximum: 0.095 mg/l

Final:
FW Daily maximum: 0.135 mg/l
SW Daily Maximum: 0.095 mg/l
FW-SW Daily Maximum: 0.095 mg/l

Iron

Although iron may be present in some products stored on site, the State Water Quality Standards (Regulation 61-68) were revised in 2008 to remove surface water criterion for iron. Therefore, iron will no longer be included in the permit.

Chromium III

Previous Permit Limits: Sampling is required when hydrostatic test water is discharged from used tanks and pipes.
FW Daily maximum: MR mg/l
SW Daily Maximum: MR mg/l

Other information: Industry sources of chromium III include combustion of coal and oil.[1]

Conclusion: There is reasonable potential to cause a water quality violation at all dilutions and for all waterbody types. Limits for all waters will be added. Since chromium may be expected to be present in gasoline products, monitoring should not be limited to just hydrostatic testing discharges, but to any discharge with the potential for contact with gasoline. Therefore, sampling is required for all discharges from bulk terminals that have the potential for gasoline contact.

Compliance schedule: No schedule of compliance is needed to meet the limits based on DMR data.

FW Daily maximum: variable based on DF3
Highest dilution: 0.923 mg/l
Middle Dilution: 0.312 mg/l
Lowest Dilution: 0.178 mg/l

SW Daily Maximum: variable based on DF3
Highest dilution: NA (not limited due to the high value derived at this dilution)
Middle Dilution: 0.312 mg/l

[1] National Pollutant Inventory, Australia, Chromium III, http://www.npi.gov.au/database/substance-info/profiles/24.html#industrysources

Lowest Dilution: 0.178 mg/l
FW-SW Daily Maximum: variable based on DF3
Highest dilution: 0.923 mg/l
Middle Dilution: 0.312 mg/l
Lowest Dilution: 0.178 mg/l

Chromium VI

Previous Permit Limits: Sampling is required when hydrostatic test water is discharged from used tanks and pipes.
FW Daily maximum: MR mg/l
SW Daily Maximum: MR mg/l

Other information: Chromium hexacarbonyl (Cr(CO)6) is used as a gasoline additive.[1]

Conclusion: There is reasonable potential to cause a water quality violation at all dilutions and for all waterbody types. Limits for all waters will be added. Since chromium may be expected to be present in gasoline products, monitoring should not be limited to just hydrostatic testing discharges, but to any discharge with the potential for contact with gasoline. Therefore, sampling is required for all discharges from bulk terminals that have the potential for gasoline contact.

Compliance schedule: No schedule of compliance is needed to meet the limits based on DMR data.
FW Daily maximum: 0.079 mg/l
SW Daily Maximum: variable based on DF3
Highest dilution: 1.1 mg/l
Middle Dilution: 0.264 mg/l
Lowest Dilution: 0.151 mg/l
FW-SW Daily Maximum: 0.079 mg/l

Benzene

Previous Permit Limits: Sampling required for discharges from loading racks and hydrostatic testing of used tanks and pipelines.
FW Daily maximum: 0.1 mg/l
SW Daily Maximum: 0.07 mg/l

Other information: This parameter is known to be present in gasoline and other petroleum products due to their composition[2].

Conclusion: Permit limits for FW and SW will continue in this permit with the addition of limits for FW-SW brackish waters. Limits will be variable based on dilution due to the range of values based on source water protection. Sampling is required for all discharges from bulk terminals that have the potential for petroleum product contact.

Compliance schedule: No schedule of compliance is needed to meet the limits based on DMR data.
FW Daily maximum: variable based on DF4
Highest dilution: 0.125 mg/l
Middle Dilution: 0.063 mg/l
Lowest Dilution: 0.005 mg/l
SW Daily Maximum: variable based on DF4
Highest dilution: 0.125 mg/l
Middle Dilution: 0.063 mg/l
Lowest Dilution: 0.005 mg/l
FW-SW Daily Maximum: variable based on DF4
Highest dilution: 0.125 mg/l
Middle Dilution: 0.063 mg/l
Lowest Dilution: 0.005 mg/l

Ethylbenzene

Previous Permit Limits: Sampling required for discharges from loading racks and hydrostatic testing of used tanks and

[2] http://www.cee.vt.edu/ewr/environmental/teach/gwprimer/btex/btex.html#2.%20Gasoline%20Composition

pipelines.
FW Daily maximum: 1.94 mg/l
SW Daily Maximum: 0.013 mg/l

Other information: This parameter is known to be present in gasoline and other petroleum products due to their composition[3].

Conclusion: Since there is no reasonable potential, FW limits will be removed and monitoring only will be required. Previous permit limits for SW will continue in this permit based on backsliding. Limits for FW-SW brackish waters have been added due to reasonable potential. Sampling is required for all discharges from bulk terminals that have the potential for petroleum product contact.

Compliance schedule: No schedule of compliance is needed to meet the limits based on DMR data.
FW Daily maximum: MR mg/l
SW Daily Maximum: 0.013 mg/l
FW-SW Daily Maximum: 0.026 mg/l

Toluene

Previous Permit Limits: Sampling required for discharges from loading racks and hydrostatic testing of used tanks and pipelines.
FW Daily maximum: 1.06 mg/l
SW Daily Maximum: 0.190 mg/l

Other information: This parameter is known to be present in gasoline and other petroleum products due to their composition.[3]

Conclusion: Since there is no reasonable potential, limits will be removed and monitoring only will be required. Sampling is required for all discharges from bulk terminals that have the potential for petroleum product contact.

Compliance schedule: No schedule of compliance is needed to meet the limits based on DMR data.
FW Daily maximum: MR mg/l
SW Daily Maximum: MR mg/l
FW-SW Daily Maximum: MR mg/l

Xylenes

Previous Permit Limits: Sampling required for discharges from loading racks and hydrostatic testing of used tanks and pipelines.
FW Daily maximum: 0.50 mg/l
SW Daily Maximum: MR mg/l

Other information: This parameter is known to be present in gasoline and other petroleum products due to their composition[3].

Conclusion: Since there is reasonable potential, limits for FW will remain. Limits for SW will be removed and monitoring only will be required since there is no reasonable potential. Limits for FW-SW will be added. Sampling is required for all discharges from bulk terminals that have the potential for petroleum product contact.

Compliance schedule: No schedule of compliance is needed to meet the limits based on DMR data.
FW Daily maximum: 0.50 mg/l
SW Daily Maximum: MR mg/l
FW-SW Daily Maximum: 0.50 mg/l

1,2-Dichloroethane

Previous Permit Limits: Sampling is required for discharges of leaded gasoline products.
FW Daily maximum: MR mg/l
SW Daily Maximum: MR mg/l

Other information: This parameter is expected to be present in leaded gasoline.

Conclusion: Permit limits for FW, SW and FW-SW will be added based on reasonable potential. Limits will be variable based on dilution due to the range of values for source water protection. Sampling is required for discharges that have the potential for leaded gasoline product contact.

Compliance schedule: No schedule of compliance is needed to meet the limits based on DMR data.

FW Daily maximum: variable based on DF4
Highest dilution: 0.093 mg/l
Middle Dilution: 0.011 mg/l
Lowest Dilution: 0.001 mg/l
SW Daily Maximum: variable based on DF4
Highest dilution: 0.093 mg/l
Middle Dilution: 0.011 mg/l
Lowest Dilution: 0.001 mg/l
FW-SW Daily Maximum: variable based on DF4
Highest dilution: 0.093 mg/l
Middle Dilution: 0.011 mg/l
Lowest Dilution: 0.001 mg/l

Acenaphthylene (syn:.acenaphthalene)

Previous Permit Limits: Sampling is required when storm water or wash water is discharged from loading areas where petroleum solvents, light distillate oils or residual oils are transferred.
FW Daily maximum: MR mg/l
SW Daily Maximum: MR mg/l

Other information: Acenaphthylene may be present in petroleum solvents, light distillate oils or residual oils.

Conclusion: There is reasonable potential to cause a water quality violation at all dilutions and for all waterbody types. Limits for all waters will be added. Sampling is required when storm water or wash water is discharged from loading areas where petroleum solvents, light distillate oils or residual oils are transferred.

Compliance schedule: No schedule of compliance is needed to meet the limits based on DMR data (wrong PQLs were used for many samples).
FW Daily Maximum: 0.0007 mg/l
SW Daily Maximum: 0.0007 mg/l
FW-SW Daily Maximum: 0.0007 mg/l

Fluorene

Previous Permit Limits: Sampling is required when storm water or wash water is discharged from loading areas where light distillate oils or residual oils are transferred.
FW Daily maximum: MR mg/l
SW Daily Maximum: MR mg/l

Other information: Fluorene may be present in light distillate oils or residual oils.

Conclusion: There is no reasonable potential to cause a water quality violation for FW discharges. Monitoring only will be required for FW discharges. For SW and FW-SW, reasonable potential exists at all dilutions. Limits for SW and FW-SW will be added. Sampling is required when storm water or wash water is discharged from loading areas where light distillate oils or residual oils are transferred.

Compliance schedule: No schedule of compliance is needed to meet the limits based on DMR data.
FW Daily Maximum: MR mg/l
SW Daily Maximum: 0.018 mg/l
FW-SW Daily Maximum: 0.018 mg/l

Naphthalene

Previous Permit Limits: Sampling is required when storm water or wash water is discharged from loading areas where petroleum solvents, light distillate oils or residual oils are transferred.
FW Daily maximum: MR mg/l
SW Daily Maximum: MR mg/l

Other information: Naphthalene may be present in petroleum solvents, light distillate oils or residual oils.

Conclusion: There is no reasonable potential to cause a water quality violation for any discharge to any waterbody type. Monitoring only will be required.. Sampling is required when storm water or wash water is discharged from loading areas where petroleum solvents, light distillate oils or residual oils are transferred.

Compliance schedule: No schedule of compliance is needed since no limits are required.
FW Daily Maximum: MR mg/l
SW Daily Maximum: MR mg/l
FW-SW Daily Maximum: MR mg/l

Methyl tert-Butyl Ether

Previous Permit Limits: Sampling is required when unleaded gasoline is stored or transferred.
FW Daily maximum: 42 mg/l
SW Daily Maximum: NA

Other information: Methyl tertiary butyl ether (MTBE) is used as a gasoline additive for several purposes. It has been added in relatively low concentrations to increase octane ratings in premium grade fuels since the late 1970's. Beginning in the early 1990's MTBE has been added in much higher concentrations (up to 15 percent) to enhance gasoline combustion and reduce tailpipe emissions. MTBE is the most common fuel oxygenate, used in more than 80 percent of oxygenated fuels.

The USEPA has not established drinking water standards for MTBE. In December 1997 the USEPA issued a "Drinking Water Advisory" for MTBE of 20 to 40 micrograms per liter (µg/L), primarily for taste and odor considerations.[3]

Conclusion: There is no reasonable potential to cause a water quality violation for FW discharges. Since there is no established criterion for MTBE and there is no reasonable potential (using the existing criterion of 20 mg/l for FW aquatic life), monitor and report will continue for FW so that data is available in the future if an MCL is developed. MR will be added for FW-SW discharges also. Sampling is required when unleaded gasoline is stored or transferred.

Compliance schedule: No schedule of compliance is needed to meet the limits based on DMR data.
FW Daily Maximum: MR mg/l
SW Daily Maximum: NA
FW-SW Daily Maximum: MR mg/l

Surfactants

Previous Permit Limits: Sampling is required when cleaning agents are introduced to the discharge.
FW Daily maximum: MR mg/l
SW Daily Maximum: MR mg/l

Other information: Reg.61-68.E.5.b states that all surface waters shall at all times, regardless of flow, be free from floating debris, oil, grease, scum and other floating material attributable to sewage, industrial waste, or other waste in amounts sufficient to be unsightly to such a degree to cause a nuisance or interfere with classified or existing water uses.

The previous permit referenced a secondary MCL for foaming agents of 0.5 mg/l based on the State's Primary Drinking Water Regulation (R.61-58). Since this is a secondary MCL and has not also been adopted in the State's Water Quality Standards (R.61-68), that value will not be used in setting limits.

Conclusion: There is currently no established numeric water quality criterion for surfactants. Therefore, monitoring will continue for all waterbody types in the event a future limit is developed. Sampling is required when cleaning agents are introduced to the discharge.

Compliance schedule: No schedule of compliance is needed because no limits are required.
FW Daily Maximum: MR mg/l
SW Daily Maximum: MR mg/l
FW-SW Daily Maximum: MR mg/l

Total Residual Chlorine

Previous Permit Limits: Sampling is required when chlorine is present in wash water and hydrostatic test water due to the use of a chlorinated water source or if additives with chlorine are used.

---

[3] USGS California Water Science Center – MTBE, http://ca.water.usgs.gov/mtbe/

FW Daily maximum: MR mg/l
SW Daily Maximum: MR mg/l

Sampling is required when chlorine is present in utility water due to the use of a chlorinated water source or if additives with chlorine are used.

FW Daily maximum: 0.019 mg/l
SW Daily Maximum: 0.013 mg/l

Other information: Chlorine is mainly present due to the use of a chlorinated water source for hydrostatic testing and wash water.

Conclusion: There is reasonable potential to cause a water quality violation for discharges to all waterbody types. Limits for FW and SW will continue and limits for FW-SW will be added. Sampling is required when chlorine is present in wash water, hydrostatic test water or utility water due to the use of a chlorinated water source or if additives with chlorine are used. The permittee may demonstrate due to a long flow path that limits on TRC are not needed.

Compliance schedule: No schedule of compliance will be allowed since the previous permit had limits.

FW Daily Maximum: 0.019 mg/l
SW Daily Maximum: 0.013 mg/l
FW-SW Daily Maximum: 0.013 mg/l

Temperature

Previous Permit Limits: Sampling is required when utility water is discharged.

FW Daily maximum: 90°F
SW Daily Maximum: 90°F

Other information: Per Reg. 61-68.E.12.a and c, the water temperature of all Freshwaters which are free flowing or lakes shall not be increased more than 5°F (2.8°C) above natural temperature conditions and shall not exceed a maximum of 90°F (32.2°C) as a result of the discharge of heated liquids unless a different temperature standard as provided for in C.12 has been established, a mixing zone as provided in C.10 has been established, or a Section 316(a) determination under the Federal Clean Water Act has been completed. Per Reg. 61-68.E.12.b, The weekly average water temperature of all Shellfish Harvesting, Class SA and Class SB waters shall not exceed 4°F (2.2°C) above natural conditions during the fall, winter or spring, and shall not exceed 1.5°F (0.8°C)) above natural conditions during the summer as a result of the discharge of heated liquids unless a different temperature standard as provided for in C.12 has been established, a mixing zone as provided for in C.10 has been established, or a Section 316(a) determination under the Federal Clean Water Act has been completed.

Conclusion: A temperature limit is needed due to the discharge of heated liquids. Limits will be the same as the previous permit with the addition of language to protect for the increase above natural conditions.

Compliance schedule: No schedule of compliance will be allowed since the limits are basically the same as the previous permit.

FW Daily maximum: 90°F and the water temperature of all freshwaters shall not be increased more than 5°F (2.8°C) above natural temperature conditions

SW Daily Maximum: 90°F and the weekly average water temperature of all Shellfish Harvesting, Class SA and Class SB waters shall not exceed 4°F (2.2°C) above natural conditions during the fall, winter or spring, and shall not exceed 1.5°F (0.8°C)) above natural conditions during the summer

FW-SW Daily Maximum: 90°F and the weekly average water temperature of all Shellfish Harvesting, Class SA and Class SB waters shall not exceed 4°F (2.2°C) above natural conditions during the fall, winter or spring, and shall not exceed 1.5°F (0.8°C)) above natural conditions during the summer

Total Dissolved Solids (TDS)

Previous Permit Limits: Sampling is required when boiler blowdown is discharged.

FW Daily maximum: 500 mg/l
SW Daily Maximum: 500 mg/l

Other information: A limit of 500 mg/l has been used in the NPDES General Permit for Utility Water Discharges based on professional judgment.

Conclusion: TDS will be limited as in the previous permit. Limits will also be added for FW-SW discharges. Sampling is required when boiler blowdown is discharged.

Compliance schedule: No schedule of compliance is needed because the same limits as the previous permit are required.
FW Daily maximum: 500 mg/l
SW Daily Maximum: 500 mg/l
FW-SW Daily Maximum: 500 mg/l

Biochemical Oxygen Demand (BOD_5)

Previous Permit Limits: Sampling is required when utility water is discharged.
FW Daily maximum: 20 mg/l
SW Daily Maximum: 20 mg/l

Other information: A limit of 20 mg/l has been used in the NPDES General Permit for Utility Water Discharges based on professional judgment.

Conclusion: BOD will be limited as in the previous permit for utility water discharges. Limits will also be added for FW-SW discharges. Sampling is required when utility water is discharged.

Compliance schedule: No schedule of compliance is needed because the same limits as the previous permit are required.
FW Daily maximum: 20 mg/l
SW Daily Maximum: 20 mg/l
FW-SW Daily Maximum: 20 mg/l

Ethanol (denatured)

Previous Permit Limits: none

Other information: Ethanol is also known as ethyl alcohol or grain alcohol. Like gasoline, ethanol contains hydrogen and carbon, but ethanol also contains oxygen in its chemical structure. The addition of oxygen makes for a cleaner burning fuel than gasoline. Fuel ethanol will mix with water, but at high enough concentrations of water, the ethanol will separate from the gasoline.[4] Ethanol is volatile and spills of undiluted ethanol are likely to volatilize very quickly. In contact with water, ethanol dissolves and biodegrades quickly. The short life of ethanol in the environment contrasts sharply with that of methyl tertiary butyl ether (MTBE), the additive ethanol is replacing, which is much more persistent in both ground water and surface water.[5]

Conclusion: No monitoring for ethanol will be required at this time. A condition requiring the SWPPP to be updated for ethanol storage has been added. Other requirements for ethanol may be added in the future if the measures adopted in the SWPPP are not successful in preventing its discharge.

Whole Effluent Toxicity (WET)

Previous permit requirements: Acute pass/fail testing at an ATC = 100% with a "pass" limit requirement. Sampling for acute WET is required for all discharges except those consisting solely of storm water from diked containment areas.
FW: *Ceriodaphnia dubia* is the test species
SW: *Mysidopsis bahia* is the test species

Other information: Several facilities have failed acute WET tests over the past several years.

Conclusion: The previous permit included an acute WET limit. The limit is needed for several reasons. One reason is that there are parameters which are limited in the permit that have limits below the practical quantitation limit (PQL). Per R.61-68.E.14.c(2) and (3), biological monitoring and/or WET testing is required when limits are below the PQL. Another reason is that there are many toxicants potentially present in the discharge such that limits on chemical-specific parameters alone may not be protective. R.61-9.122.44(d) states that limits on WET are needed when reasonable potential exists.

Sampling for acute WET is required for all discharges except those consisting solely of storm water from diked

[4] http://www.dnr.mo.gov/pubs/pub2206.pdf

[5] EPA Response To Comments Regarding Modification of NPDES Permit for Global Petroleum Corporation, MA0003425, http://www.epa.gov/region1/npdes/permits/attachments/finalma0003425rtc.pdf (NPDES permit issued June 30, 2005).

containment areas where there is no potential for petroleum product contamination. Testing shall be conducted annually.

Compliance schedule: No schedule of compliance is needed because the same limits as the previous permit are required.

Reopener Clause

The permit contains a reopener clause for all parameters that are specified as monitor and report (MR) in the permit. In the event that data indicates the need for a future limit, the permit may be reopened to include such limit. Also, for ethanol, in the event that the SWPPP does not control the discharge adequately, alternate permit requirements may be needed.

Summary of Permit Monitoring Requirements

Table 3: Summary of Monitoring Requirements by Parameter

Parameter	Leaded Gasoline	Unleaded Gasoline	Petroleum Solvents	Light Distillate Oils	Residual Oils	Hydrostatic Test Waters	Utility Water	Wash Water
Benzene	X	X				X		
Toluene	X	X				X		
Ethylbenzene	X	X				X		
Xylenes, total	X	X				X		
Lead, total	X	X	X	X	X	X	X	X
Zinc, total	X	X	X	X	X	X	X	X
1,2-dichloroethane	X					X		
MTBE		X				X		
Naphthalene			X	X	X	X		
Acenaphthylene			X	X	X	X		
Fluorene				X	X	X		
Chromium III	X	X				X		
Chromium IV	X	X				X		
GRO	X	X				X		
DRO			X	X	X	X		
Copper, total	X	X	X	X	X	X	X	X
Surfactants								X
TRC						X	X	X
BOD_5						X	X	
TSS	X	X	X	X	X	X	X	X
TDS							X	
Temperature							X	

Limits for Individual Facilities

Since some of the limits in the permit are variable, spreadsheets have been run for each existing facility. A summary of the proposed limits for each facility, using the dilution ranges determined earlier, is included in Attachment 6. Previous permit limits (from existing DMRs) are also summarized and included in this attachment.

Summary of Information of Information on Existing Facilities

Attachment 7 includes a summary of information obtained from DHEC files and permit applications for each existing facility. This information has been used to determine what sampling is required for each facility based on what is stored and transferred.

Tank solids and bottoms

Tank bottom sediments accumulate over 4-5 years (typically ½- to 1-inch thick) and invasive rainwater (1-6 inches thick) regularly settles to the bottom of any bulk storage container. These layers typically mix at the interface with overlying fuel to form a ¾-inch-thick foamy waste called a "rag layer." Because of the relatively high levels of hydrocarbon compounds

contained in these three wastes layers, their discharge is not permitted by this permit.

Sludge Disposal

Many facilities have no routine sludge disposal or do not generate any sludge due to the type of treatment or lack of treatment. If sludge disposal is necessary, the Department shall be made aware where sludge will be sent and have an approval letter of acceptance from the facility that will accept the sludge for disposal. This correspondence shall be submitted at least 30 days prior to the need for sludge disposal. The quantity of sludge to be disposed of and the length of time the approval for disposal is valid shall be included as well as the results of tests used to determine whether the sludge is hazardous. This submittal shall be for informational purposes only, but the Department may request additional information as necessary to assure appropriate disposal is performed. This information is to be sent to both the main DHEC office and the local office.

II. GENERAL INFORMATION

A. The effluent from this facility may be subject to the requirements of any of the following regulations: R.61-9.125, 129, 133, and 403; 40 CFR Part 136; Subchapter N (40 CFR Parts 400 through 402 and 404 through 471); R.61-9.503, R.61-9.504 and R.61-9.505.

B. Authority: This permit is written in accordance with applicable laws and regulations including, but not limited to, Regulation 61-9, Regulation 61-68, Pollution Control Act and Clean Water Act.

C. Under R.61-9.124.8 (Fact Sheet), a fact sheet shall be prepared for every draft permit for a major NPDES facility or activity, for every Class I sludge management facility, for every NPDES draft permit that incorporates a variance or requires an explanation under section 124.56(b), and for every draft permit which the Department finds is the subject of wide-spread public interest or raises major issues. The Rationale will be included as an attachment to the Fact Sheet prepared under this regulation.

D. The conclusions noted in the Rationale establish proposed effluent limitations and permit requirements addressed in R.61-9.122.43 (Establishing Permit Conditions), R.61-9.122.44 (Establishing Limitations, Standards and other permit conditions) and other appropriate sections of R.61-9.

III. BACKGROUND AND PROCEDURES FOR PERMIT LIMIT DEVELOPMENT

A. The receiving water 7Q10, annual average flow, tidal flow, tidal dilution or other critical flow condition at the discharge point, and 7Q10, annual average flow, tidal flow, tidal dilution or other critical flow condition at the boundary of the source water protection area above a proposed or existing drinking water intake (if applicable) are determined by the SCDHEC's Wasteload Allocation Section. The 7Q10, Annual Average Flow or other critical flow conditions are based on information published or verified by the USGS, an estimate extrapolation from published or verified USGS data or from data provided by the permittee. These flows may be adjusted by the Wasteload Allocation Section to account for existing water withdrawals that impact the flow. The 7Q10 (or 30Q5 if provided by the applicant), annual average flow at the discharge point, or other critical flow condition or 7Q10 (or 30Q5 if provided by the applicant), annual average flow or other critical flow condition at the boundary of the SWP area for a proposed or existing drinking water intake will be used to determine dilution factors, as appropriate, in accordance with R.61-68.C.4.a & 4.b for aquatic life, human health, and organoleptic effects respectively.

B. Water and organism consumption and drinking water MCL data will be evaluated as human health values when calculating dilution factors. "The Department may, after Notice of Intent included in a notice of a proposed NPDES permit in accordance with Regulation 61-9.124.10, determine that drinking water MCLs or W/O shall not apply to discharges to those waterbodies where there is: no potential to affect an existing or proposed drinking water source and no state-approved source water protection area." For permitting purposes, a proposed drinking water source is one for which a complete permit application, including plans and specifications for the intake, is on

file with the Department at the time of consideration of an NPDES permit application for a discharge that will affect or has the potential to affect the drinking water source." See R.61-68.E.14.c(5). The Department defines the source water protection (SWP) area to be the primary SWP area delineated by the Source-Water Assessment and Protection (SWAP) Program initiated by the EPA and required by the states to identify SWP areas to protect drinking water sources. Using the procedure described in the document entitled, "Determination of the Primary and Secondary Source-Water Protection Areas for Selected Surface-Water Public-Supply Systems in South Carolina, 1999," USGS Water Resource Investigations Report 00-4097, the primary SWP area for a drinking water intake is the area which encompasses all 14-digit Hydrologic Unit Code (HUC) basins that adjoin streams, tributaries, and reservoirs between an intake and the upstream 10-percent exceedance, 24-hour travel distance (TOT_{10}). The entire basin above a drinking water intake has been designated as the SWP area where the drainage area is equal to or less than one HUC basin or is estimated to have less than 24-hours of instream travel time between the intake and the HUC basin in the headwaters of the drainage basin.

C. Application of numeric criteria to protect human health: If separate numeric criteria are given for organism consumption, water and organism consumption (W/O), and drinking water Maximum Contaminant Levels (MCLs), they shall be applied as appropriate. The most stringent of the criteria shall be applied to protect the existing and classified uses of the waters of the State. See R.61-68.E.14.b(1).

D. Numeric criteria have been established in R.61-68 based on organoleptic data (prevention of undesirable taste and odor). For those substances which have aquatic life and/or human health numeric criteria and organoleptic numeric criteria, the most stringent of the three shall be used for derivation of permit effluent limitations. See R.61-68.E.13.

E. Sampling Frequency: Samples and measurements taken for the purpose of monitoring shall be representative of the monitored activity. Monitoring results must be conducted according to test procedures approved under 40 CFR Part 136, unless other test procedures have been specified in the permit (R.61-9.122.41). Typically requirements to report monitoring results shall be established on a case-by-case basis with a frequency dependent on the nature and effect of the discharge but in no case less than once a year (R.61-9.122.44)

F. Compliance Schedules

1. A person issued an NPDES permit by the Department who is not in compliance with applicable effluent standards and limitations or other requirements contained therein at the time the permit is issued, shall be required to achieve compliance within a period of time as set forth by the Department, with effluent standards and limitations, with water quality standards, or with specific requirements or conditions set by the Department. The Department shall require compliance with terms and conditions of the permit in the shortest reasonable period of time as determined thereby or within a time schedule for compliance which shall be specified in the issued permit.

2. If a time schedule for compliance specified in an NPDES permit which is established by the Department, exceeds nine (9) months, the time schedule shall provide for interim dates of achievement for compliance with certain applicable terms and conditions of the permit. (R.61-9.122.47)

G. Procedure for establishing effluent limitations:

1. Effluent limits (mass and concentration) for Five day Biochemical Oxygen Demand (BOD_5), Ultimate Oxygen Demand (UOD), Dissolved Oxygen (DO), Total Ammonia Nitrogen (as N), and Nutrients are established by the Wasteload Allocation (WLA) Section, with consideration given to technology-based limitations.

a. Five day Biochemical Oxygen Demand BOD_5, Ultimate Oxygen Demand (UOD), Dissolved Oxygen (DO):

Effluent limits for conventional oxygen demanding constituents (BOD_5, UOD and DO) are established to protect in-stream water quality and uses, while utilizing a portion of the assimilative capacity of the

receiving water. The ability of a water body to assimilate oxygen-demanding substances is a function of its physical and chemical characteristics above and below the discharge point. Various mathematical techniques, called models, have been developed to estimate this capacity. The Department follows the procedures as outlined in the "State/EPA Region IV Agreement on the Development of Wasteload Allocations/Total Maximum Daily Loads and NPDES Permit Limitations" dated October 30, 1991 (as updated) for determining the assimilative capacity of a given water body. Mathematical models such as QUAL2E and QUAL2E-UNCAS are used in accordance with "Enhanced Stream Water Quality Models QUAL2E and QUAL2E-UNCAS: Documentation and Users Manual" (EPA/600/3-87/007; dated May 1987) as updated. BOD_5 and UOD values determined from modeling results will be used in permitting as monthly average derived limits (C_{wla}). Daily maximum derived limits will be determined by multiplying the monthly average value by two.

For facilities subject to effluent guidelines limitations or other technology-based limitations, BOD_5 will also be evaluated in accordance with the applicable industrial categorical guidelines. These parameters will be identified in Part III of this rationale when they are applicable to the permit.

b. Total Ammonia Nitrogen (as N):

Ammonia limitations based on oxygen demand will be determined from modeling information as described above. These values will be used as monthly average derived limits and a daily maximum will be determined by multiplying the monthly average derived limit by two. These values will be compared with the ammonia water quality criteria for protection of aquatic life from Regulation 61-68 and any categorical limitations. The more stringent of the limitations will be imposed. Calculations for aquatic life criteria and other wasteload recommendations will be shown in Part I of this rationale when ammonia is a pollutant of concern.

c. Discharges of Nutrients:

In order to protect and maintain lakes and other waters of the State, consideration is given to the control of nutrients reaching the waters of the State. Therefore, in accordance with regulation R.61-68.E.11, the Department controls the nutrients as prescribed below. Nutrient limitations will be determined from the best available information and/or modeling performed by the Wasteload Allocation Section to meet these water quality standards.

i. Discharges of nutrients from all sources, including point and nonpoint, to waters of the State shall be prohibited or limited if the discharge would result in or if the waters experience growths of microscopic or macroscopic vegetation such that the water quality standards would be violated or the existing or classified uses of the waters would be impaired. Loading of nutrients shall be addressed on an individual basis as necessary to ensure compliance with the narrative and numeric criteria.

ii. Numeric nutrient criteria for lakes are based on an ecoregional approach which takes into account the geographic location of the lakes within the State and are listed below. These numeric criteria are applicable to lakes of 40 acres or more. Lakes of less than 40 acres will continue to be protected by the narrative criteria.

1. for the Blue Ridge Mountains ecoregion of the State, total phosphorus shall not exceed 0.02 mg/l, chlorophyll *a* shall not exceed 10 ug/l, and total nitrogen shall not exceed 0.35 mg/l

2. for the Piedmont and Southeastern Plains ecoregions of the State, total phosphorus shall not exceed 0.06 mg/l, chlorophyll *a* shall not exceed 40 ug/l, and total nitrogen shall not exceed 1.50 mg/l

3. for the Middle Atlantic Coastal Plains ecoregion of the State, total phosphorus shall not exceed 0.09 mg/l, chlorophyll *a* shall not exceed 40 ug/l, and total nitrogen shall not exceed 1.50 mg/l.

iii. In evaluating the effects of nutrients upon the quality of lakes and other waters of the State, the Department may consider, but not be limited to, such factors as the hydrology and morphometry of the waterbody, the existing and projected trophic state, characteristics of the loadings, and other control mechanisms in order to protect the existing and classified uses of the waters.

iv. The Department shall take appropriate action, to include, but not limited to: establishing numeric effluent limitations in permits, establishing Total Maximum Daily Loads, establishing waste load allocations, and establishing load allocations for nutrients to ensure that the lakes attain and maintain the above narrative and numeric criteria and other applicable water quality standards.

v. The criteria specific to lakes shall be applicable to all portions of the lake. For this purpose, the Department shall define the applicable area to be that area covered when measured at full pool elevation.

2. Effluent concentration limits (C_{efflim}) for parameters other than the parameters listed in G.1.a-c above are established using the following procedures:

Q_{7Q10}	7Q10 or other critical flow condition of the receiving water at the discharge point in mgd. (may require adjustment for withdrawals)
AAF_d	Average Annual Flow (AAF) or other critical flow condition of the receiving water at the discharge point in mgd. (may require adjustment for withdrawals)
Q_{7Q10i}	7Q10 or other critical flow condition of the receiving water at the SWP Area boundary in mgd.
AAF_i	Average Annual Flow (AAF) or other critical flow condition of the receiving water at the SWP Area boundary in mgd.
Q_d	Long term average discharge flow in mgd.

a. Determine dilution factors, where not provided by modeling:
The following information is to be used (where applicable) for establishing effluent concentration limits:

DF_1: Dilution factor based on 7Q10 or other critical flow condition of the receiving water at the discharge point (Q_{7Q10}). This dilution factor is used to determine the derived limits for protection of the following aquatic life and human health concerns for the reasons indicated:

i. Aquatic Life (see R.61-68.C.4.a(1)). Protection of aquatic life on a short-term basis is needed at the point where aquatic organisms become exposed to the discharge.

ii. Human Health – Organism Consumption for parameters identified as non-carcinogens per R.61-68.C.4.b(1). Protection for human health on a short-term basis for consumption of aquatic organisms is needed at the point the aquatic organisms become exposed to the discharge.

$$DF_1 = \left(\frac{Q_{7Q10} + Q_d}{Q_d} \right)$$

DF_2: Dilution factor, at the discharge point, based on the Average Annual Flow or tidal flow of the receiving water at the discharge point (AAF_d). This dilution factor is used to determine the derived limits for protection of the following human health and organoleptic concerns for the reasons indicated:

i. Human Health – Organism Consumption for parameters identified as carcinogens per R.61-68.C.4.b(1). Protection for human health on a long-term basis to prevent cancer due to consumption of aquatic organisms is needed at the point the aquatic organisms become exposed to the discharge where it enters the receiving water.

ii. Organoleptic effects per R.61-68.C.4.b(1). Protection for taste and odor issues related to the discharge is needed at the point where the discharge enters the receiving water.

$$DF_2 = \left(\frac{AAF_d + Q_d}{Q_d} \right)$$

DF_3: Dilution factor based on the 7Q10 or other critical flow condition at the source water protection area boundary for protection of a proposed or existing water intake downstream of the discharge (Q_{7Q10i}). This dilution factor is used to determine the derived limits for protection of the following human health concerns for the reasons indicated:

i. Human Health – Water and Organism Consumption for parameters identified as non-carcinogens per R.61-68.C.4.b(1) and E.14.c(5) to protect for short-term health effects when the discharge is above any drinking water intake. Protection of human health relative to drinking the water from the waterbody and consuming aquatic organisms from the same water body is provided by this criterion, but drinking the water withdrawn from the waterbody may require a potentially higher level of protection in terms of applicable dilution than consumption of organisms. In addition, to satisfy the requirements of R.61-68.C.10(a), the Department has determined that dilution at the boundary of the Source Water Protection area will protect the source water protection area and drinking water intake to meet this requirement.

For discharges except those to lakes affecting the primary source water protection (SWP) area, dilution will be determined using the largest flow (7Q10 or annual average flow, as appropriate) associated with any TOT10 point along the SWP area boundary upstream of the drinking water intake of concern. For discharges to lakes affecting the primary SWP area, dilution will be determined using the sum of the flows (7Q10 or average annual flow, as appropriate) associated with all TOT10 point(s) along the SWP area boundary upstream of the drinking water intake of concern. If multiple drinking water intakes are present below the discharge, the SWP area of the intake closest to the discharge will be protected. If the entire basin is designated as the SWP area, the boundary will be the TOT10 at the beginning of the basin, even if it is outside the State boundaries (e.g. North Carolina).

ii. Human Health - Drinking Water Maximum Contaminant Level (MCL) for parameters identified as non-carcinogens per R.61-68.C.4.b(1) and E.14.c(5) to protect for short-term health effects when the discharge is above any drinking water intake. Protection of human health relative to drinking the water from the receiving water after conventional treatment per R.61-68.G is provided by this criterion. In addition, to satisfy the requirements of R.61-68.C.10(a), the Department has determined that dilution at the boundary of the Source Water Protection area will protect the source water protection area and drinking water intake to meet this requirement.

For discharges except those to lakes affecting the primary source water protection (SWP) area, dilution will be determined using the largest flow (7Q10 or annual average flow, as appropriate) associated with any TOT10 point along the SWP area boundary upstream of the

drinking water intake of concern. For discharges to lakes affecting the primary SWP area, dilution will be determined using the sum of the flows (7Q10 or average annual flow, as appropriate) associated with all TOT10 point(s) along the SWP area boundary upstream of the drinking water intake of concern. If multiple drinking water intakes are present below the discharge, the SWP area of the intake closest to the discharge will be protected. If the entire basin is designated as the SWP area, the boundary will be the TOT10 at the beginning of the basin, even if it is outside the State boundaries (e.g. North Carolina).

$$DF_3 = \left(\frac{Q_{7Q10i} + Q_d}{Q_d} \right)$$

DF_4: Dilution factor based on the Average Annual Flow or tidal flow at the source water protection area boundary for protection of a proposed or existing water intake downstream of the discharge (AAF_i). This dilution factor is used to determine the derived limits for protection of the following human health concerns for the reasons indicated:

i. Human Health–Water and Organism Consumption for parameters identified as carcinogens per R.61-68.C.4.b(1) and E.14.c(5) to protect for long-term health effects due to cancer when the discharge is above any drinking water intake. Protection of human health relative to drinking the water from the receiving water and consuming aquatic organisms from the same receiving water is provided by this criterion, but drinking the water withdrawn from the receiving water may require a potentially higher level of protection in terms of applicable dilution than consumption of organisms. In addition, to satisfy the requirements of R.61-68.C.10(a), the Department has determined that dilution at the boundary of the Source Water Protection area will protect the source water protection area and drinking water intake to meet this requirement.

For discharges except those to lakes affecting the primary source water protection (SWP) area, dilution will be determined using the largest flow (7Q10 or annual average flow, as appropriate) associated with any TOT10 point along the SWP area boundary upstream of the drinking water intake of concern. For discharges to lakes affecting the primary SWP area, dilution will be determined using the sum of the flows (7Q10 or average annual flow, as appropriate) associated with all TOT10 point(s) along the SWP area boundary upstream of the drinking water intake of concern. If multiple drinking water intakes are present below the discharge, the SWP area of the intake closest to the discharge will be protected. If the entire basin is designated as the SWP area, the boundary will be the TOT10 at the beginning of the basin, even if it is outside the State boundaries (e.g. North Carolina).

ii. Human Health - Drinking Water Maximum Contaminant Level (MCL) for parameters identified as carcinogens per R.61-68.C.4.b(1) and E.14.c(5) to protect for long-term health effects due to cancer when the discharge is above any drinking water intake. Protection of human health relative to drinking the water from the receiving water and consuming aquatic organisms from the same receiving water is provided by this criterion, but drinking the water withdrawn from the receiving water may require a potentially higher level of protection in terms of applicable dilution than consumption of organisms. In addition, to satisfy the requirements of R.61-68.C.10(a), the Department has determined that dilution at the boundary of the Source Water Protection area will protect the source water protection area and drinking water intake to meet this requirement.

For discharges except those to lakes affecting the primary source water protection (SWP) area, dilution will be determined using the largest flow (7Q10 or annual average flow, as

appropriate) associated with any TOT10 point along the SWP area boundary upstream of the drinking water intake of concern. For discharges to lakes affecting the primary SWP area, dilution will be determined using the sum of the flows (7Q10 or average annual flow, as appropriate) associated with all TOT10 point(s) along the SWP area boundary upstream of the drinking water intake of concern. If multiple drinking water intakes are present below the discharge, the SWP area of the intake closest to the discharge will be protected. If the entire basin is designated as the SWP area, the boundary will be the TOT10 at the beginning of the basin, even if it is outside the State boundaries (e.g. North Carolina).

$$DF_4 = \left(\frac{AAF_i + Q_d}{Q_d} \right)$$

b. Determine monthly average derived limits using the following procedures:

WQS_{al} Receiving water Standard (based on an established criteria or other published data per R.61-68) for protection of Aquatic Life; may be a CCC or CMC as defined below

WQS_{org} Receiving water Standard (based on an established criteria or other published data per R.61-68) for protection of Human Health – Organism Consumption

WQS_{wo} Receiving water Standard (based on an established criteria or other published data per R.61-68), for protection of Human Health – Water & Organism Consumption. Applicable only if any portion of the mixing zone for this discharge is in a state-approved source water protection area for a proposed or existing water intake downstream of the discharge point.

WQS_{mcl} Receiving water Standard (based on an established criteria or other published data per R.61-68), for Drinking Water MCL (Maximum Contaminant Level). Applicable only if any portion of the mixing zone for this discharge is in a state-approved source water protection area for a proposed or existing water intake downstream of the discharge point.

WQS_{ol}: Receiving water Standard (based on an established criteria or other published data per R.61-68), based on Organoleptic Data.

C_{aqlife} Concentration limit derived from aquatic life data

C_{HH} Concentration limit derived from human health data as determined from organism (C_{org}), water/organism (C_{wo})and MCL (C_{mcl}) data

C_{ol} Concentration limit derived from organoleptic data

C_b Background concentration of the concerned parameter in mg/l is typically determined from ambient monitoring data or data provided by applicant. If the waterbody to which the discharge flows is not on the 303(d) list, the 90th percentile of ambient monitoring data for aquatic life protection for the parameters identified in the Appendix (Water Quality Numeric Criteria) to Regulation 61-68 from the last 3 years, or whatever is available if less than 3 years, will typically be used. If the waterbody to which the discharge flows is not on the 303(d) list, the median value of ambient monitoring data for human health protection for the parameters identified in the Appendix (Water Quality Numeric Criteria) to Regulation 61-68 from the last 3 years, or whatever is available if less than 3 years, will typically be used. The background concentration is assumed to be zero (0) in the absence of actual data based on Departmental guidance and EPA recommendation.

i. Determine the derived limits for protection of Aquatic Life (C_{aqlife})

1. The following guidelines apply to determining aquatic life limits using this basic equation:

$$C_{aqlife} = (DF_1 \times WQS_{al}) - \left\{ C_b \times \left(\frac{Q_{7Q10}}{Q_d} \right) \right\}$$

a. Typically, the Criterion Maximum Concentration (CMC) is applied as a daily maximum derived limit and the Criterion Continuous Concentration (CCC) is applied as a monthly average derived limit, after consideration of dilution and background concentrations. The CMC and CCC for specific metals will be adjusted using the procedures in 60 FR 22229, "Water Quality Standards; Establishment of Numeric Criteria for Priority Toxic Pollutants; States' Compliance-Revision of Metals Criteria," May 4, 1995 and the "Technical Guidance on Interpretation and Implementation of Aquatic Life Metals Criteria," Oct. 1, 1993 and applied as a daily maximum and monthly average, respectively, after consideration of dilution and background concentrations. For specific metals, this calculation is explained in detail later in this rationale.

monthly average = C_{aqlife} using CCC as WQS_{al}
daily maximum = C_{aqlife} using CMC as WQS_{al}

b. If only a CMC exists for a particular parameter, the daily maximum derived permit limit will be set using that value, after consideration of dilution and background concentrations. If no other values (e.g., human health) exist for that parameter on which to base a monthly average limit and the discharge is continuous, the monthly average will be set equal to the daily maximum to satisfy Regulation 61-9.122.45(d). In no case shall the monthly average limit be set higher than the daily maximum limit. If only a CCC is given, it will be used as a monthly average derived limit and the daily maximum derived limit will be two (2) times the value obtained for the monthly average based on a simplified statistical procedure for determining permit limits recommended in Section 5.4.2 of the US EPA's "Technical Support Document for Water Quality-based Toxics Control", EPA/505/2-90-001, March 1991 (hereafter known as the TSD).

If a CCC exists and no CMC exists and no other acute or chronic data exists, the aquatic life limits are

monthly average = C_{aqlife} using CCC as WQS_{al}
daily maximum = 2 x C_{aqlife}

If a CMC and no CCC exists, and no other acute or chronic data exists, the aquatic life limits are

monthly average = C_{aqlife} using CMC as WQS_{al}
daily maximum = C_{aqlife} using CMC as WQS_{al}

c. If only an acute toxicity effect concentration for a number of species for a particular pollutant is given as a LC_{50}, the lowest concentration should be divided by an acute-to-chronic ratio (ACR) of 10 and a sensitivity factor of 3.3, for an acceptable instream concentration in order to protect against chronic toxicity effects (R.61-68.E.16.a(1)). Other acute toxicity data will be handled similarly. The value obtained from this calculation will be used as a monthly average derived limit after consideration of dilution and background concentrations. The daily maximum will be two (2) times the value obtained for the monthly average based on a simplified statistical procedure for determining permit limits recommended in Section 5.4.2 of the TSD.

monthly average = C_{aqlife} using other data as WQS_{al}
daily maximum = 2 x C_{aqlife}

d. If a chronic toxicity effect concentration for a number of species for a particular pollutant is given as a no observed effect concentration (NOEC), the lowest concentration should be divided by a sensitivity factor of 3.3 in order to protect against chronic toxicity to the most sensitive species (R.61-68.E.16.a(2)). Other chronic toxicity data will be handled similarly. The value obtained from this calculation will be used as a monthly average derived limit after consideration of dilution and background concentrations. The daily maximum will be two (2) times the value obtained for the monthly average based on a simplified statistical procedure for determining permit limits recommended in Section 5.4.2 of the TSD.

monthly average = C_{aqlife} using other data as WQS_{al}
daily maximum = 2 x C_{aqlife}

e. If both acute and chronic data are available for a particular pollutant, monthly average derived limit will be calculated as in c and d above for each acute and chronic, respectively. The more stringent of the monthly average derived limits will be the monthly average derived limit used after consideration of dilution and background concentrations. The daily maximum will be two (2) times the value obtained for the monthly average based on a simplified statistical procedure for determining permit limits recommended in Section 5.4.2 of the TSD.

monthly average = C_{aqlife} using other data as WQS_{al}
daily maximum = 2 x C_{aqlife}

f. Consider the background concentration (C_b) of the parameter of concern. If the background concentration is equal to or greater than the applicable standard (*WQS*, as defined above) for the parameter of concern, then the derived concentration limit (C_{aqlife}) for that parameter is established equal to the standard (*WQS*) so that no additional amount of that pollutant is added to the waterbody. An exception exists where the naturally occurring instream concentration for a substance is higher than the derived permit effluent limitation. In those situations, the Department may establish permit effluent limitations (C_{efflim}) at a level higher than the derived limit, but no higher than the natural background concentration (i.e. a "rise above background" limit). In such cases, the Department may require biological instream monitoring and/or whole effluent toxicity (WET) testing (R.61-68.E.14.c(2)).

If C_b is not based on naturally occurring concentrations and

$$C_b \geq WQS$$

Then, generally,

$$C_{\text{aqlife}} = WQS.$$

If C_b is based on naturally occurring concentrations and

$$C_b \geq WQS$$

Then, generally,

$$C_{\text{aqlife}} < C_{eff\ \text{lim}} \leq C_b.$$

2. Metals: Regulation 61-9.122.45(c) requires that permit limits be expressed in terms of total recoverable metal (with limited exceptions). In order to translate from the water quality criterion to a total recoverable metal, Regulation R.61-68.E.14.c(4) provides for the use of the EPA Office of Water Policy and "Technical Guidance on Interpretation and Implementation of Aquatic Life Metals Criteria", October 1, 1993. A subsequent revision published in the Federal Register (60 FR 22229) on May 4, 1995 updated the data in the original report. See R.61-68 Appendix for CMC and CCC values and equations, Attachment 1 for "Conversion Factors for Dissolved

Metals" and Attachment 2 "Parameters for Calculating Freshwater Dissolved Metals Criteria that are Hardness-Dependent".

Per R.61-68.E.14.a(3), the CMC and CCC are based on a hardness of 25 mg/l if the ambient or mixed stream hardness is equal to or less than 25 mg/l. Concentrations of hardness less than 400 mg/l may be based on the mixed stream hardness if it is greater than 25 mg/l and less than 400 mg/l and 400 mg/l if the ambient stream hardness is greater than 400 mg/l. The ambient stream hardness is assumed to be 25 mg/l in the absence of actual stream data. Mixed stream hardness may be determined using flow-weighted effluent hardness and stream hardness.

The following equations and constants will be used to calculate aquatic life metals limits based on these documents. The values of the terms referenced in this section and determined from the equations below are included in the Metals spreadsheet attached to this rationale.

a. Freshwater: The following metals are subject to this section:

arsenic	lead
cadmium	mercury
chromium (III & VI)	nickel
copper	zinc

The equation for C_d below changes the total metal to dissolved metal. From Technical Guidance Manual for Performing Waste Load Allocations Book II, Rivers and Streams, EPA/440/484/022.

$$S = CCC \; or \; CMC \quad \text{(adjusted for hardness)}$$
$$C_d = S \times CF$$

where C_d = Dissolved metal concentration (µg/l)
S = a constant to represent the CCC or CMC (µg/l)
CF = Conversion factor considered most relevant in fresh water for aquatic life as defined by EPA for each metal

Once the dissolved metal concentration is known, determine C_p using the equation for C_d above and the following equations.

$$C_p = C_d \times \left\{1 + \left(K_{pb} \times TSS_b \times 10^{-6}\right)\right\}$$

$$K_{pb} = K_{po} \times (TSS_b)^a$$

where C_p = Particulate sorbed metal concentration (µg/l). This value represents the revised water quality criterion for the metal to be used for ambient data comparison.
K_{pb} = Linear partition coefficient using the stream TSS (liters/mg)
K_{po} = Metal-specific equilibrium constant (liters/mg)
a = Metal-specific constant
TSS_b = Background or in-stream Total Suspended Solids (TSS) concentration (mg/l). The background TSS is assumed to be 1 mg/l in the absence of actual instream data based on the 5th percentile of ambient TSS data on South Carolina waterbodies from 1993-2000.

To determine the effluent limit (C_{aqlife}), use the following equations to translate the limits into a total recoverable metal concentration.

$$TSS_{avg} = \frac{(Q_d \times TSS_e) + (Q_{7Q10} \times TSS_b)}{Q_d + Q_{7Q10}}$$

where TSS_e = Effluent Total Suspended Solids (TSS) concentration (mg/l) determined from actual long-term average data or proposed permit limits if no data available.

TSS_{avg} = Average in-stream (mixed) TSS concentration (mg/l)

$$C_t = C_d \times \left\{1 + \left(K_p \times TSS_{avg} \times 10^{-6}\right)\right\}$$

$$K_p = K_{po} \times (TSS_{avg})^a$$

where C_t = Total metal concentration (µg/l)

K_p = Linear partition coefficient (liters/mg). This is the distribution of metal at equilibrium between the particulate and dissolved forms.

Once C_t has been calculated, it is multiplied by DF_1 and background concentrations are accounted for to obtain the derived limit (max or avg) (C_{aqlife}):

$$C_{aqlife} = (C_t \times DF_1) - \left\{C_b \times \left(\frac{Q_{7Q10}}{Q_d}\right)\right\}$$

monthly average = C_{aqlife} based on CCC
daily maximum = C_{aqlife} based on CMC

b. Saltwater: So that metals may be expressed in terms of total recoverable metal as required by R.61-9.122.45(c), the saltwater CCC and CMC will be used in the calculation of limits for all other parameters not included in paragraph 2 above. Monthly average derived limits (C_{aqlife}) for aquatic life protection are calculated as follows:

$$C_{aqlife} = (DF_1 \times WQS_{al}) - \left\{C_b \times \left(\frac{Q_{7Q10}}{Q_d}\right)\right\}$$

c. The more stringent of the freshwater or saltwater metals calculations above will be used where protection of both freshwater and saltwater organisms is needed.

ii. Determine derived limits for protection of Human Health

1. The following guidelines apply to determining human health limits:

a. The human health criterion given by Regulation 61-68 will be applied as a monthly average derived limit after consideration of dilution and background concentrations ($C_{HH\text{-}avg}$). Exceptions exist based on EPA criteria and are indicated for specific parameters. No limits on human health based on water and organism consumption or drinking water MCLs will be

imposed if there is no potential to affect an existing or proposed drinking water intake and no state-approved source water protection area (i.e., if there is no intake downstream of the discharge) in accordance with Regulation 61-68.E.14.c(5).

b. The daily maximum permit limit will be determined from the monthly average value from (a) above and a multiplier (*M*) determined using a statistical procedure recommended in Section 5.5 using average = 95th percentile from Table 5-3 in the TSD. The permitted or proposed number of samples per month (n) is used with the coefficient of variation (CV) to determine *M*.

$$M = \frac{e^{(Z_m\sigma - 0.5\sigma^2)}}{e^{(Z_a\sigma_n - 0.5\sigma_n^2)}}$$

where:

$$\sigma_n^2 = \ln\left(\frac{CV^2}{n} + 1\right)$$

$$\sigma^2 = \ln\left(CV^2 + 1\right)$$

CV = coefficient of variation of the effluent concentration. For a data set where n>10, the CV is calculated as standard deviation divided by mean for the data set being evaluated. For data set where n<10, the CV is estimated to equal 0.6. For less than 10 items of data, the uncertainty in the CV is too large to calculate a standard deviation or mean with sufficient confidence.

n = the number of effluent samples per month (where frequency is less than 1/month, n =1)

z_m = the percentile exceedance probability for the daily maximum permit limit (=2.326 for 99th percentile basis)

z_a = the percentile exceedance probability for the monthly average permit limit (=1.645 for 95th percentile basis)

$$C_{HH\text{-}max} = M * C_{HH\text{-}avg}$$

c. Consider the background concentration (C_b) of the parameter of concern. If the background concentration is equal to or greater than the applicable standard (*WQS*, as defined above) for the parameter of concern, then the derived concentration limit (C_{HHe}) for that parameter and for the protection of that standard is established equal to the standard (*WQS*). An exception exists where the naturally occurring instream concentration for a substance is higher than the derived permit effluent limitation. In those situations, the Department may establish permit effluent limitations (C_{efflim}) at a level higher than the derived limit, but no higher than the natural background concentration (i.e. a "rise above background" limit). In such cases, the Department may require biological instream monitoring and/or whole effluent toxicity (WET) testing (See R.61-68.E.14.c(3)).

If C_b is not based on naturally occurring concentrations and

$$C_b \geq WQS$$

Then, generally,

$$C_{HH} = WQS .$$

If C_b is based on naturally occurring concentrations and

$$C_b \geq WQS$$

Then, generally,

$$C_{HH} < C_{eff\ \lim} \leq C_b .$$

2. Human Health – Organism Consumption (C_{org}).

   a. For Carcinogens

   The Monthly Average is calculated as follows:

$$C_{org} = (DF_2 \times WQS_{org}) - \left\{ C_b \times \left(\frac{AAF_d}{Q_d} \right) \right\}$$

   The Daily Maximum is calculated as

$$C_{org\text{-}max} = M * C_{org}$$

   b. For Non-carcinogens

   The Monthly Average is calculated as follows:

$$C_{org} = (DF_1 \times WQS_{org}) - \left\{ C_b \times \left(\frac{Q_{7Q10}}{Q_d} \right) \right\}$$

   The Daily Maximum is calculated as

$$C_{org\text{-}max} = M * C_{org}$$

3. Human Health – Water and Organism Consumption (C_{wo})

   a. For Carcinogens

   The Monthly Average is calculated as follows:

$$C_{wo} = (DF_4 \times WQS_{wo}) - \left\{ C_b \times \left(\frac{AAF_i}{Q_d} \right) \right\}$$

   The Daily Maximum is calculated as

$$C_{wo\text{-}max} = M * C_{wo}$$

   b. For Non-carcinogens

   The Monthly Average is calculated as follows:

$$C_{wo} = (DF_3 \times WQS_{wo}) - \left\{ C_b \times \left(\frac{Q_{7Q10i}}{Q_d} \right) \right\}$$

   The Daily Maximum is calculated as

$$C_{wo\text{-}max} = M * C_{wo}$$

4. Human Health – Drinking Water Maximum Contaminant Level (MCL) (C_{mcl}).

a. For Carcinogens
The Monthly Average is calculated as follows:

$$C_{mcl} = (DF_4 \times WQS_{mcl}) - \left\{ C_b \times \left(\frac{AAF_i}{Q_d} \right) \right\}$$

The Daily Maximum is calculated as

$$C_{mcl\text{-}max} = M * C_{mcl}$$

b. For Non-carcinogens
The Monthly Average is calculated as follows:

$$C_{mcl} = (DF_3 \times WQS_{mcl}) - \left\{ C_b \times \left(\frac{Q_{7Q10i}}{Q_d} \right) \right\}$$

The Daily Maximum is calculated as

$$C_{mcl\text{-}max} = M * C_{mcl}$$

5. Organoleptic criteria (C_{ol}).

The Monthly Average is calculated as follows:

$$C_{ol} = (DF_2 \times WQS_{ol}) - \left\{ C_b \times \left(\frac{AAF_d}{Q_d} \right) \right\}$$

The Daily Maximum is calculated as

$$C_{ol\text{-}max} = M * C_{ol}$$

iii. Parameters given in a wasteload allocation for oxygen-demanding pollutants and nutrients will be limited as

monthly average = C_{wla}
daily maximum = 2 x C_{wla}

c. Determine the most stringent of applicable water quality data using the derived limits determined above:

monthly average C_{efflim} = minimum of derived monthly averages (C_{aqlife}, C_{org}, C_{wo}, C_{mcl}, C_{ol}, C_{wla})
daily maximum C_{efflim} = minimum of derived daily maximums (C_{aqlife}, $C_{org\text{-}max}$, $C_{wo\text{-}max}$, $C_{mcl\text{-}max}$, $C_{ol\text{-}max}$, $C_{wla\text{-}max}$)

d. Determine whether the discharge causes, has the reasonable potential to cause or contributes to a water quality violation.

Regulation 61-9.122.44(d)(1)(i) states: "Limitations must control all pollutants or pollutant parameters (either conventional, nonconventional, or toxic pollutants) which the Department determines are or may be discharged at a level which will cause, have the reasonable potential to cause, or contribute to an excursion

above any State water quality standard, including State narrative criteria for water quality."

When determining whether a discharge causes, has the reasonable potential to cause or contributes to an instream excursion, the Department will use procedures which account for controls on point and nonpoint sources of pollution, the variability of the pollutant in the effluent, the sensitivity of the species to toxicity testing (when evaluating whole effluent toxicity), and, where appropriate, the dilution of the effluent in the receiving water (R.61-9.122.44(d)(1)(ii)).

Based on the above statements, there are three scenarios when limitations are required, as follows:

i. When data provided by the permit applicant indicates discharge values greater than the proposed limitation derived above, that discharge may cause an excursion above a narrative or numeric water quality criterion.

ii. A discharge may be determined to contribute to an excursion of a water quality criterion when the waterbody is impaired (e.g., on the 303(d) list) for the parameter of concern and that parameter is also being discharged at levels above the water quality criterion.

iii. Reasonable potential to cause a water quality violation is determined using the following information:

The Department will primarily use EPA's Technical Support Document (TSD) for determining reasonable potential using effluent data. Other methods may be used as well to evaluate data sets. All pollutants given in a wasteload allocation or an effluent limitation guideline will be limited in the permit.

When effluent data consists of non-quantifiable/non-detectable values or when no effluent data is available, other factors and information are considered to determine reasonable potential. In situations where a pollutant is known to be present in the wastestream (due to production data or other information), we know it is being discharged and has the potential to impact even though it may not be quantifiable. The fact that it is present will be enough information to say reasonable potential exists for that pollutant. Therefore, a reasonable potential decision is based on various data and information, and not just non-quantifiable/non-detectable data. Consideration is given to existing data, dilution in the waterbody, type of receiving water, designated use, type of industry/wastestream, ambient data, history of compliance, and history of toxic impact. If any source of information indicates reasonable potential to cause or contribute to an exceedance of the water quality standard, a water quality limit will be established.

Note: The result of the following calculations may indicate that reasonable potential does not exist. However, as stated above, other information may "override" this numerical determination to justify the need for a limit.

1. The procedure for determining reasonable potential from actual effluent data is explained in Box 3-2 on page 53 of the TSD. Multiplying factors are determined from Table 3-2 at a 95% confidence level and 95% probability in Section 3.3.2. The following describes the procedures used for determining reasonable potential for chemical-specific parameters and WET, under certain circumstances. More information on determining reasonable potential for WET is given in Item 2 below.

   Step 1: Data Analysis: The statistical calculations involved in the "Reasonable Potential" analysis require discrete numerical data. The following describes how the effluent data will be used in determining reasonable potential.

Actual analytical results should be used whenever possible. Results less than detection and quantification should be used as follows:

a. If the permittee reports results below the practical quantitation limit (PQL) (as defined by the permit), then the reported "less than PQL" value for a given sample is generally assumed to be zero.

b. If the permittee uses a detection/quantification level that is **greater** than the PQL, then the reported "less than" value for a given sample is generally assumed to be a discrete value equal to the detection/quantification level used by the permittee.

c. If the reported data consists of both discrete and non-discrete values and/or the data is reported using varying detection/quantification levels, then, generally, a combination of the above two approaches is used, or the data is evaluated in a manner that is most appropriate for that data set.

Note: For information on the acceptable analytical methods and PQLs please refer to NPDES permit application attachment titled "Practical Quantitation Limits (PQL) and Approved Test Methods."

Step 2: Using data from the permit application, other data supplied by the applicant and/or Discharge Monitoring Report (DMR) data, determine the total number of observations (n) for a particular set of effluent data and determine the highest value (C_{max}) from that data set. For the monthly average comparison, the data set will include monthly average results and n will be the number of months in which they sampled in the time period being evaluated. For the daily maximum comparison, the data set will include daily maximum results and n will be the total number of samples in the time period being evaluated. Individual results may not necessarily be used in the calculation.

Step 3: Determine the coefficient of variation (CV) for the data set. For a data set where $n>10$, the CV is calculated as standard deviation divided by mean for the data set being evaluated. For data set where $n<10$, the CV is estimated to equal 0.6. For less than 10 items of data, the uncertainty in the CV is too large to calculate a standard deviation or mean with sufficient confidence.

$$CV = 0.6 \quad \text{for} \quad n < 10$$

$$CV = \frac{\sigma}{\mu} \quad \text{for} \quad n > 10$$

where: σ = Standard Deviation of the samples
μ = Mean of the samples

Step 4: Determine the appropriate multiplying factor (MF) from either Table 3-2 or using the formulae in Section 3.3.2 of the TSD.

a. Determine the percentile represented by the highest concentration in the sample data.

$$p_n = (1 - Confidence\ Level)^{1/n}$$

where: p_n = Percentile represented by the highest concentration in the data
n = number of samples
Confidence Level = 0.95 i.e. 95%

b. Determine the multiplying factor (*MF*), which is the relationship between the percentile described above (C_p) and the selected upper bound of the lognormal effluent distribution, which in this case will be the 95th percentile (C_{95}).

$$MF = \frac{C_{95}}{C_p} = \frac{e^{(Z_{95}\sigma + 0.5\sigma^2)}}{e^{(Z_p\sigma + 0.5\sigma^2)}}$$

where: Z_{95} is the standardized Z-score for the 95th percentile of the standardized normal distribution = 1.645

Z_p is the standardized Z-score for the p^{th} percentile of the standardized normal distribution.(determined in (b) above)

Note: The values of Z-scores are listed in tables for the normal distribution. If using Microsoft® Excel, this can be calculated using the NORMSINV function.

$$\sigma^2 = \ln(CV^2 + 1)$$

$$\sigma = \sqrt{\ln(CV^2 + 1)}$$

Step 5: Multiply the highest value from the data set (C_{max}) by the multiplying factor (*MF*) determined in Step 4 to obtain the maximum receiving water concentration (*RWC*).

$$RWC = C_{\max} \times MF$$

Step 6: *RWC* $\leq$ Derived limit (C_{efflim}) implies that reasonable potential does not exist.

RWC > Derived limit (C_{efflim}) implies that reasonable potential exists.

2. Reasonable potential for Whole Effluent Toxicity (WET) may be determined from numerical data using the following procedure:

a. When the effluent data is given in terms of percent effluent as an IC_{25}, LC_{50} and/or NOEC values:

Step 1: Convert the given values to toxic units: TU_a for acute data and TU_c for chronic data, respectively, using the following formulae. Please note that an NOEC derived using the IC_{25} is approximately the analogue of an NOEC derived using hypothesis testing. The IC_{25} is the preferred statistical method for determining the NOEC (EPA TSD, March 1991, p.6).

$$TU_a = \frac{100}{LC_{50}}$$

$$TU_c = \frac{100}{NOEC} \quad \text{or} \quad TU_c = \frac{100}{IC_{25}} \text{ if } IC_{25} \text{ available}$$

Step 2: Using DMR data or other data provided by the applicant, determine the total number of observations (n) for a particular set of effluent data and determine the highest value ($TU_{a,\ max}$ or $TU_{c,\ max}$) from that data set.

Step 3: Determine the coefficient of variation (CV) for the data set. For a data set where $n>10$, the CV is calculated as standard deviation divided by mean. For data set where $n<10$, the CV is estimated to equal 0.6. For less than 10 items of data, the uncertainty in the CV is too large to calculate a standard deviation or mean with sufficient confidence.

Step 4: Determine the appropriate multiplying factor (MF) from either Table 3-2 or using the formulae in Section 3.3.2. (see iii.1, Step 4 above).

Step 5: Multiply the highest value of $TU_{a,\ max}$ or $TU_{c,\ max}$ from the data set by the multiplying factor (MF) determined in Step 4 and the dilution at the edge of the mixing zone (the test concentration obtained from mixing zone modeling or demonstration) to obtain the maximum receiving water concentration (RWC)

RWC for Acute Toxicity = [$TU_{a,\ max}$ * MF * *conc. at MZ boundary]*
RWC for Chronic Toxicity = [$TU_{c,\ max}$ * MF * *conc. at MZ boundary*]

Step 6: RWC for Acute Toxicity $\leq 0.3TU_a$ implies that a reasonable potential does not exist
RWC for Acute Toxicity $> 0.3TU_a$ implies that a reasonable potential exists

RWC for Chronic Toxicity $\leq 1.0TU_c$ implies that a reasonable potential does not exist
RWC for Chronic Toxicity $>1.0TU_c$ implies that a reasonable potential exists

b. When pass/fail effluent data only is available and all tests have passed, the Department may be able to determine reasonable potential in a manner similar to above assuming the test concentration of interest is greater than or equal to the concentration at which the permittee has tested. If the permittee has not tested at or above the test concentration of interest, the Department cannot say that reasonable potential does not exist, unless perhaps, circumstances related to the discharge have changed. If any failures exist in the data set, reasonable potential may be determined to exist.

c. Other methods for determining reasonable potential may be used if appropriately justified.

H. Other considerations

1. When the derived permit effluent limitation based on aquatic life numeric criteria is below the practical quantitation limit for a substance, the derived permit effluent limitation shall include an accompanying statement in the permit that the practical quantitation limit using approved analytical methods shall be considered as being in compliance with the limit. Appropriate biological monitoring requirements shall be incorporated into the permit to determine compliance with appropriate water quality standards (R.61-68.E.14.c(2)).

2. When the derived permit effluent limitation based on human health numeric criteria is below the practical quantitation limit for a substance, the derived permit effluent limitation shall include an accompanying

statement in the permit that the practical quantitation limit using approved analytical methods shall be considered as being in compliance with the limit (R.61-68.E.14.c(3)).

3. The effluent concentration limits determined above may not necessarily be the NPDES permit limit. NPDES Permit limits are determined after a reasonable potential analysis is conducted using these derived limits and also after evaluating other issues such as anti-backsliding and antidegradation.

4. When mass limits are calculated, the formula to be used is as follows.

$$Mass\ (lb/day) = Flow\ (mgd) * Concentration\ (mg/l) * 8.345$$

5. Per Regulation 61-9.122.45(d), for continuous discharges all permit effluent limitations, standards, and prohibitions, including those necessary to achieve water quality standards, shall unless impracticable be stated as maximum daily and average monthly discharge limitations for all dischargers other than publicly owned treatment works.

6. Antibacksliding: When a permit is reissued, the terms and conditions of the reissued permit must be at least as stringent as those final limits in the previous permit unless certain exceptions are met (see Regulation 61-9.122.44.l).

IV. PROCEDURES FOR REACHING A FINAL PERMIT DECISION

A. Comment Period (R.61-9.124.10 and 11)

The Department of Health and Environmental Control proposes to issue an NPDES permit to this applicant subject to the effluent limitations and special conditions outlined in this document. These determinations are tentative.

During the public comment period, any interested person may submit written comments on the draft permit to the following address:

SC Dept. of Health and Environmental Control
Water Facilities Permitting Division
Bureau of Water
2600 Bull Street
Columbia, South Carolina 29201

For additional information, interested persons may contact Melinda Vickers at 803-898-4186.

All written comments received during the public comment period shall be considered in making the final decision and shall be responded to as prescribed below.

Per R.61-9.124.17, the Department is only required to issue a response to comments when a final permit is issued. This response shall:

1. Specify which provisions, if any, of the draft permit have been changed in the final permit decision, and the reasons for the change; and

2. Briefly describe and respond to all significant comments on the draft permit raised during the public comment period, or during any hearing.

The response to comments shall be available to the public.

B. Public Hearings (R.61-9.124.11 and 12)

During the public comment period, any interested person may request a public hearing, if no hearing has already been scheduled. A request for a public hearing shall be in writing and shall state the nature of the issues proposed to be raised in the hearing.

Determinations and Scheduling.

1. Within the thirty (30) day comment period or other applicable comment period provided after posting or publishing of a public notice, an applicant, any affected state or interstate agency, the Regional Administrator or any other interested person or agency may file a petition with the Department for a public hearing on an application for a permit. A petition for a public hearing shall indicate the specific reasons why a hearing is requested, the existing or proposed discharge identified therein and specifically indicate which portions of the application or other permit form or information constitutes necessity for a public hearing. If the Department determines that a petition constitutes significant cause or that there is sufficient public interest in an application for a public hearing, it may direct the scheduling of a hearing thereon.

2. A hearing shall be scheduled not less than four (4) nor more than eight (8) weeks after the Department determines the necessity of the hearing in the geographical location of the applicant or, at the discretion of the Department, at another appropriate location, and shall be noticed at least thirty (30) days before the hearing. The notice of public hearing shall be transmitted to the applicant and shall be published in at least one (1) newspaper of general circulation in the geographical area of the existing or proposed discharge identified on the permit application and shall be mailed to any person or group upon request thereof. Notice shall be mailed to all persons and governmental agencies which received a copy of the notice or the fact sheet for the permit application.

3. The Department may hold a single public hearing on related groups of permit applications.

4. The Department may also hold a public hearing at its discretion, whenever, for instance, such a hearing might clarify one or more issues involved in the permit decision;

5. Public notice of the hearing shall be given in accordance with R.61-9.124.10.

Any person may submit oral or written statements and data concerning the draft permit. Reasonable limits may be set upon the time allowed for oral statements, and the submission of statements in writing may be required. The public comment period under R.61-9.124.10 shall automatically be extended to the close of any public hearing under this section. The hearing officer may also extend the comment period by so stating at the hearing.

A tape recording or written transcript of the hearing shall be made available to the public.

C. Obligation to raise issues and provide information during the public comment period. (R.61-9.124.13)

All persons, including applicants, who believe any condition of a draft permit is inappropriate or that the Department's tentative decision to deny an application, terminate a permit, or prepare a draft permit is inappropriate, must raise all reasonably ascertainable issues and submit all reasonably available arguments supporting their position by the close of the public comment period (including any public hearing). No issue shall be raised during an appeal by any party that was not submitted to the administrative record as part of the preparation and comment on a draft permit, unless good cause is shown for the failure to submit it. Any supporting materials which are submitted shall be included in full and may not be incorporated by reference, unless they are already part of the administrative record in the same proceeding, or consist of State or Federal statutes and regulations, Department and EPA documents of general applicability, or other generally available reference materials. Commenters shall make supporting materials not already included in the administrative record available.

(A comment period longer than 30 days may be necessary to give commenters a reasonable opportunity to comply with the requirements of this section. Additional time shall be granted under R.61-9.124.10 to the extent that a commenter who requests additional time demonstrates the need for such time).

D. Issuance and Effective Date of the Permit

1. After the close of the public comment period on a draft permit, the Department shall issue a final permit decision. The Department shall notify the applicant and each person who has submitted written comments or requested notice of the final permit decision. This notice shall include reference to the procedures for appealing a decision on a permit. For the purposes of this section, a final permit decision means a final decision to issue, deny, modify, revoke and reissue, or terminate a permit.

2. A final permit decision shall become effective 30 days after the service of notice of the decision unless:

   (a) A later effective date is specified in the decision; or

   (b) No comments requested a change in the draft permit, in which case the permit shall become effective on the effective date shown in the issued permit.

3. Issuance or Denial of Permits. An appeal to a final determination of the Department or to a condition of a permit issued or the denial of a permit pursuant to the State law and Regulation 61-9, shall be in accordance with and subject to 48-1-200 of the SC Code (see E below).

E. Adjudicatory Hearings

The issuance of this permit by the S.C. Department of Health and Environmental Control (Department) becomes the final agency decision 15 days after notice of the decision has been mailed to the applicant or respondent, unless a written request for final review is filed with the Department.

An applicant, permittee, licensee, or affected person who wishes to appeal this decision must file a written request for final review with the Clerk of the Board at the following address or by facsimile at 803-898-3323:

Clerk of the Board
SC DHEC
2600 Bull Street
Columbia, SC 29201

The request for final review should include the following:

1. The grounds on which the Department's decision is challenged and the specific changes sought in the decision,
2. A statement of any significant issues or factors the Board should consider in deciding how to handle the matter, and
3. A copy of the Department's decision or action under review.

If the 15th day occurs on a weekend or State holiday, the request is due to be received by the Clerk of the Board on the next working day. The request for final review must be received by the Clerk of the Board by 5:00 p.m. on the date it is due. If a timely request for final review is filed with the Clerk of the Board, the Clerk will provide additional information regarding procedures.

The Board of Health and Environmental Control has 60 days from the date of receipt of a request for final review to conduct a final review conference. The conference may be conducted by the Board, its designee, or a committee of three members of the Board appointed by the chair.

If a final review conference is not conducted within 60 days, the Department decision becomes the final agency decision, and a party may request a contested case hearing before the Administrative Law Court within 30 days after the deadline for the final review conference.

Information pertaining to adjudicatory matters may be obtained by contacting the Legal Office of the Department of Health and Environmental Control, 2600 Bull Street, Columbia, South Carolina or by calling 803-898-3350.